

**THE HISTORY, ECOLOGY AND CURRENT STATUS OF THE
BRIGHTON WAINSCOT *ORIA MUSCULOSA* (HÜBNER)
(LEPIDOPTERA: NOCTUIDAE): IS THIS SPECIES
ON THE VERGE OF EXTINCTION IN THE UNITED KINGDOM?**

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ABSTRACT

The history of the Brighton Wainscot *Oria musculosa* (Hübner) and its decline are discussed. A county by county chronology is presented. Recent records, along with a measure of recording effort, are given. The life cycle and ecology are covered and possible reasons for the moth's decline explored.

INTRODUCTION

Early in 1998 the British Entomological & Natural History Society's (BENHS) Conservation Working Group (CWG) produced a short list of species of macro-moths to which it felt that the Society could contribute to their conservation (Phillips & Dobson, 1998). Included in this listing was the Brighton Wainscot *Oria musculosa* (Hübner) as there was 'Some evidence of decline; possibly due to changes in agricultural practices?' (Phillips & Dobson, *loc. cit.*). Phillips (2000) again raised the opportunity for BENHS members to contribute to the conservation of this and other UK Biodiversity Action Plan (UK BAP) species.

The Brighton Wainscot (Fig. 1) was considered nationally scarce (Notable B, estimated to occur in between 31 and 100 10 km squares of the National Grid) in Hadley (1984). Waring (1999) graded the species Notable A (thought to occur in 30 or fewer 10 km squares) and just four years later Waring, Townsend & Lewington (2003) treated the Brighton Wainscot as a provisional Red Data Book species.

The species was listed on the Medium List of the UK BAP (UK Biodiversity Group, 1995) and a formal Action Plan was published in 1999 (UK Biodiversity Group, 1999). Within this plan it was stated that 'Since 1980 it [the Brighton Wainscot] has been reported from less than 25% of the ten km squares with previous records' and suggested factors causing decline could probably be attributed to changes in farming practices, including choice of crops and the time of sowing, along with the use of insecticides. The Plan lists a range of actions involving several organisations with the dual aim of maintaining populations at all known sites and maintaining 20 viable populations within the known range. The plan stipulated undertaking surveys to determine the status of the species. Butterfly Conservation (BC) was given the Lead Partner role for this Plan.

In 1999, Butterfly Conservation, with contributory funding from English Nature, employed full-time staff on *The Action for Threatened Moths Project* (Parsons *et al.*, 2000). A major part of the role of this project was to oversee the implementation of the Action Plans for the UK BAP moths for which BC is Lead Partner. At this time, the BENHS Conservation Working Group offered to assist specifically with the investigation of the requirements and distribution of three species, one being the Brighton Wainscot. The project that was developed, supplementing the work of BC, was envisaged as a three year survey programme and also included a questionnaire (prepared by JWP) that was sent to a few farmers on Salisbury Plain. This



Fig. 1. The Brighton Wainscot *Oria musculosa* Photo: D.G. Green, Butterfly Conservation.

questionnaire aimed to determine farming practices in the area. The project has been ongoing since 2000. This paper summarises both this effort and our knowledge of the species in Great Britain.

HISTORY AND DISTRIBUTION

The Nineteenth Century Records

Pratt (1999) comprehensively covers the history of this moth in Sussex. This can be summarised chronologically as follows:

1843—First known British capture by a Mr Lambert at Brighton.

1855—On 17 August, a local surgeon, J.N. Winter, took a perfect male example at a gas lamp inside the Sussex County Hospital on the outskirts of Brighton. At this time, the hospital was probably surrounded by open downland and large fields of cereals. The moth was then named “the Brighton Wainscot” (Fig. 2).

1856—Two specimens were taken, one of these in the middle of Brighton town, the other probably from the Hospital site.

1857—One example at the Hospital on 26 July.

1858—Four found in the Brighton area.

Following years up until about 1860—about 20 examples seen in the Brighton area.

After 1860, it would seem that the moth had very nearly died out in this area, with a singleton recorded in 1883 at Brighton. The final report coming in 1899 when a specimen was obtained at Devil’s Dyke, Brighton.



Fig. 2. *The Entomologist's Annual 1856*—Page 46—Rare British species captured in 1855. *Synia musculosa* (Frontispiece Fig. 3): a specimen of this pretty rarity was taken by Mr Winter on a gas-light at Brighton—17 August. Reproduced by kind permission of Dr. S. Legg, Booth Museum of Natural History, Brighton.

The moth was also reputedly captured at Bexhill in the mid 1870s (probably 1876 and/or 1877). At least six specimens were auctioned with this provenance.

The species has been presumed extinct in the county since the Devil's Dyke capture. There have been several subsequent reports, e.g. Brighton (between 1944 and 1962), Cadborough (1968), Northiam (1981 and 1982), Udimore (1996), but none of these have been confirmed and consequently all have been rejected. There was also an attempt to re-establish the moth in Sussex. In 1952 about a dozen Wiltshire moths were released into a wheat field near Brighton. This establishment attempt was unsuccessful.

The only other accepted 19th century records are from Wye, Kent, where a single example was recorded in 1881 (Chalmers-Hunt, 1962–1970) and a single example from south Devon in 1899 (McCormick, 2001).

The Twentieth Century Records

Table 1 summarises the history of the Brighton Wainscot on a county basis. The moth has been recorded from Wiltshire, Hampshire, Buckinghamshire, Berkshire, Oxfordshire during the twentieth century, with single or a few examples/records also from each of Dorset, Gloucestershire, Isle of Wight, Northamptonshire, Somerset and Surrey. The headquarters of the species in the mid twentieth century has generally been considered to be central southern England, particularly the Salisbury Plain area.

No up-to-date county list is available for Wiltshire, although in 1962 C.G.M. de Worms produced *The Macrolepidoptera of Wiltshire*. It is of interest to note in this publication that de Worms referred to *O. musculosa* as the "Downland Wainscot". Why this was the case seems to be something of a mystery, though presumably it reflected its habitat and he felt that the original name was by then somewhat inappropriate!

de Worms (1962) states that this species was "Now found to be very widespread in Wiltshire where it was originally discovered at Salisbury in 1909 by the late Harry Haynes". In total, six individuals were found in 1909 by Haynes. Other individuals were found in 1910 (3), 1911 (1), 1929 (1), 1932 (1) and another single example was said to have been taken in 1938, but it was not until 1939 that the species was proved to be well established in the wheat fields on the plain north of Salisbury (Cockayne & Kettlewell, 1940). Bearing in mind the 1909 and subsequent records, there is every possibility that it was well established before this time.

South Wiltshire subsequently produced the majority of the records with sightings from wheat fields on the northern outskirts of Salisbury (1940, 1941 & 1942 – common); Shrewton (abundant in 1940); Trowbridge (1948–1 individual); Clarendon (1948 & 1949); Pepper Box Hill (1949); Codford (almost annually, notably 1951, 1954 and 1955); Salisbury (1954); Chitterne (sometimes abundant, including 12 on 30 July 1955); West Lavington (22 seen on 3 August 1959) and also reported from Camp Hill near Stratford; Larkhill (common); and Tilshead (sometimes abundant) (de Worms, *loc. cit.*), including heavy infestation in 1951 (Jackson, 1952). It is interesting to note that Jackson (*loc. cit.*) reports that the moth was still to be found in its old headquarters north of Salisbury, but possibly not in the numbers in which it occurred during the war. The moth was still reported from several sites and, occasionally plentifully, from the Tilshead area during the 1960s, e.g. Harper (1963), and the 1970s, e.g. Brown (1976). During the 1980s, it was seen in a few sites, including Tilshead, and primarily from the Tilshead area in the 1990s (see Appendix 1). The species was last recorded from the county in the Tilshead area in 2001 (see below and Appendix 2).

Table 1. Summary of the history of the Brighton Wainscot on a county basis.

County	Date range	Notes/Source(s)
Sussex	1843 to 1899	See history above (Pratt, 1999).
Kent	1881	A single example at Wye. There are also two records one from Pittard near Darenth Wood (undated, but 19th century) and one from Wye Downs (1885), however these are both considered questionable (Chalmers-Hunt, 1962–1970).
Devon	1899	A single example in South Devon (McCormick, 2001).
South Wiltshire	1909 to 2001	(de Worms, 1962). Last records: 27 July 2001 (a single example, B. Fox) and 3 August 2001 (two, D. Green/J. McGill) (Fox, 2002).
Surrey	1925 to 1976	Noted in 1925 (a singleton); 1951; 1953; 1956 (2 sites); 1970; 1971; 1976 (a singleton) (Collins, 1997).
North Hampshire	1933 to 1983	(Goater, 1974 & 1992).
South Hampshire	1935 to 1976	(Goater, 1974 & 1992).
Buckinghamshire	1938 to 1976	Ansorge (1969) and M. Albertini (pers. comm.).
Somerset	1955 to 1976	1955, Weston-Super-Mare (C.S.H. Balthway) (Turner, 1955); 1956, Curry Rivel (G. Ford) (J. McGill, pers. comm.); 5 July 1976, a single example, Weston-Super-Mare (K. Poole) (J. McGill, pers. comm.). There is also a record from 1945 of an example found on a car radiator, the car having just made a journey from Burnham-on-Sea to Bristol and back (Heslop, 1945).
Berkshire	1950 to 1981	(Baker, 1994) and NSMRS.
North Wiltshire	1951 to 1953	(de Worms, 1962).
Isle of Wight	1952	A single example, Freshwater Marsh (Goater, 1974).
Gloucestershire	1953 & 1970	Single examples, Bourton-on the Water (1953) and Tetbury (1970) (Newton & Meredith, 1984).
Dorset	1959 to 1971	Single examples at Iwerne Minster, 24 August 1959 and 5 August 1963 (P. Davey, pers. comm.); 1971, two, Over Compton (N. Greatorex-Davies, pers. comm.).
Oxfordshire	1962 to 1973	J. Campbell and M. Townsend (pers. comm.), also Hugo (1974). There is a record from BRC for post 1961 and one on the NSMRS database for 1918 which has not been confirmed.
Northamptonshire	1970	A single example, 9 August, edge of Salcey Forest (C.C. Smith) (J. Ward, pers. comm.). There is also an undated, though post 1944 report in South (1961). No further details of this record have been traced.

Doubtful county records

Shropshire	undated	South (1961). Record considered doubtful, not included in Riley (1991).
Hertfordshire/ Bedfordshire/ Cambridgeshire	1961 onwards	There are records for 1961 onwards for grid squares TL11 and TL24 on the map in UK Biodiversity Group (1999). These records are on the NSMRS database, giving the BRC as the source. There are no cards at BRC to support these records (H. Arnold, pers. comm.) and therefore these records are treated as dubious.

In North Wiltshire there are records from Holt (1951); Ramsbury (1953); Marlborough (1957) (de Worms, *loc. cit.*); and also Alton Barnes (1951 – in numbers) (Jackson, *loc. cit.*). Surprisingly, no later records have been traced.

Goater (1974) suggests that the species spread from Wiltshire into Hampshire, being first recorded in the county at Micheldever in 1933. The moth was occasionally recorded commonly during the 1960s, e.g. 150 recorded at MV light by D.H. Sterling at Worthy Down in 1968. The species got scarcer in the county during the 1970s particularly after about 1976. It was last recorded in 1983 at Burghclere (Goater, 1992).

In Berkshire, it was considered that the moth had spread into the county from north Hampshire (Baker, 1994), possibly from as early as the late 1940s. The moth became common on at least one or two sites, for example over 50 were seen at East Garston between 31 July and 6 August 1970. The moth was recorded as common at Chieveley in 1978 (Baker, *loc. cit.*), but by 1982 it had been apparently lost to the county.

Ansorge (1969) states that "There are few records of its [Brighton Wainscot] occurrence in Buckinghamshire". The moth appears to have been first recorded in 1938 at Eton (Ansorge, *loc. cit.*) with other records from Fawley and Medmenham, both in 1962. Harman (1963) referring to Medmenham, suggests that the species was "in my opinion, breeding within a mile of here". Subsequently, it was reported on the Chilterns in 1966 (Harman, 1967) given as "the third I had seen in the county", and again in 1970 (Harman, 1971) and also seen at Bletchley in the same year (Ellerton, 1970), Turville Heath area (in 1971) and last recorded at Marlow in 1976 (M. Albertini, pers. comm.).

Many of the available records require further clarification but suggest that the moth was never resident in Oxfordshire, although it may have been overlooked, given the possible breeding in Buckinghamshire. The moth seems to have been first recorded in the county in 1962 (at SP5804), although the Biological Records Centre (BRC) has a record for post 1961 from near Henley-on-Thames and there is a also record on the National Scarce Moth Recording Scheme (NSMRS) from 1918 for Waterperry Wood. In 1964 the moth was found at Studley. The last record that can be traced is from Chipping Norton in 1973 (Hugo, 1974).

There are several other counties with just one or a few records. A few of these may possibly be explained through immigration (which may also account for at least one or two of the nineteenth century records), although the paucity of coastal records suggest that at most this is a very infrequent immigrant. Other records may be the result of wanderers or strays from the main populations in central southern England. It is worth noting that six Brighton Wainscot have been found at a ship 1.5 miles (2 km) off the coast of Cyprus showing that they do at least wander some distance from where they emerge (Darlow, 1951).

The Decline

The Brighton Wainscot's "hay-day" in this country was probably during the late 1930s and 1940s, but it still occurred regularly and sometimes commonly up until the late 1970s. It was occasionally noted in numbers during the 1980s and early 1990s, but these records all seem to refer to one site: north of Tilshead. All records that we have been able to research from 1980 to 1999 are given in Appendix 1. Three of these are from Berkshire, one from North Hampshire, the remaining records coming from Salisbury Plain in South Wiltshire. Although the majority of these are from the Tilshead area, particularly since 1990, this could reflect the recording effort being concentrated on this site, as this was a widely known site for the species amongst lepidopterists.

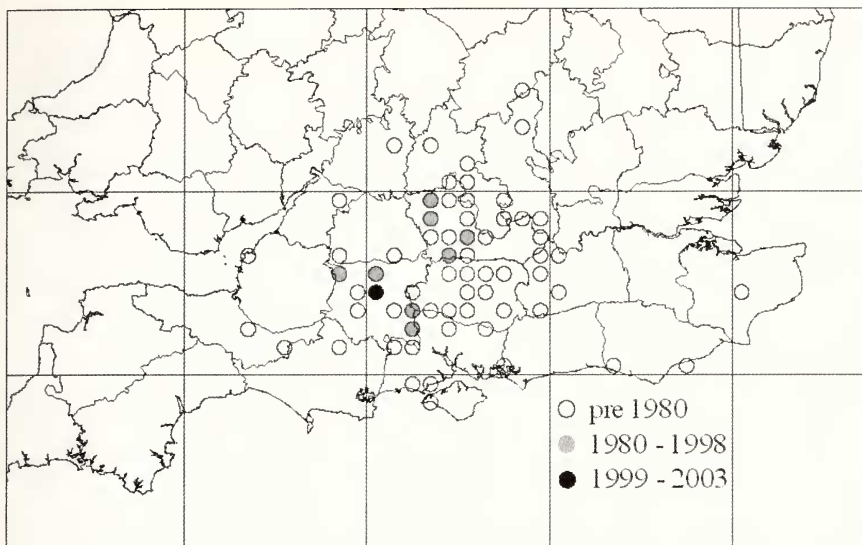


Fig. 3. Distribution of the Brighton Wainscot *Oria muscosa* in southern England. Map produced using MapMate (Teknica Ltd.).

Survey effort during the recent project (2000–2003) concentrated on Salisbury Plain again centring on Tilshead. The BENHS, along with BC, organised trapping sessions as part of a comprehensive field meetings programme (e.g. Phillips, 2003a,b, 2005). With contributory funding from English Nature, BC also employed a consultant (Barry Fox) to undertake surveys of key sites on the Plain and adjacent areas during 2001 and 2002 (Fox, 2002, 2003). In addition, a grant from the Maitland Emmet BENHS Research Fund enabled survey work to be undertaken in 2003. Several other individuals also assisted with the survey effort.

The results from this survey are very disappointing and would seem to confirm that the species is at a very low ebb and possibly on the verge of extinction in this country. Despite over 50 separate trapping sessions (Appendix 2), with, in most cases, more than one trap being used, only four Brighton Wainscot have been recorded, all from the north of Tilshead site (SU035486). The records are:

- 30 July 2000 – 1 male (S. Swift)
- 27 July 2001 – 1 male (B. Fox)
- 3 August 2001 – 2 males (D. Green/J. McGill)

However, although many sites have been surveyed, there are areas on the Plain that have not been trapped recently and may still have the potential to support this species.

To illustrate the decline of the Brighton Wainscot the distribution map (Fig. 3) gives records from pre-1980 and in the date classes 1980 to 1999 and 2000 to 2003. This breakdown approximately coincides with the collation of records, primarily by Dr P. Waring, for the as yet unpublished *Review of Nationally Scarce and Threatened Macro-moths of Great Britain* which forms the basis for the summary (with a distribution map) in the Action Plan (UK Biodiversity Group, 1999), and the duration of the current project.

European Distribution and Status

Bretherton, Goater & Lorimer (1983) give this species as Eurasiatic. In western Europe, it is widespread from Spain and Portugal to the Paris region, probably migratory in north-western France and south-eastern Belgium and very occasionally recorded in Denmark. Karsholt & Razowski (1996) add that the moth has also been recorded from Poland, the Czech Republic, Slovakia, Germany, Austria, Hungary, Yugoslavia, Romania, Bulgaria, Albania, Malta, Italy and Greece, including Crete, and Turkey. South (1961) includes Syria, North-west Africa and southern Russia.

An initial assessment of the European status of this moth was undertaken by Parsons (2001). Experts in a number of European countries responded to a questionnaire enquiring about the distribution and status of this, and the other UK BAP species, in their countries. The results for this moth were far from encouraging. *Oria muscosa* was confirmed as present from Bulgaria (12 sites, based on an incomplete return); Germany (Baden-Württemberg only) (approx. 10 sites); Portugal (3 sites, based on an incomplete return); Belgium (1 site), with the species being reported from Spain and Italy, but the number of localities being unknown. Further to this, the moth was thought to be declining in Germany, Belgium and Portugal, and its trend in Spain was not known.

Between 14–18 May, 2004, JWP found eight moths on white walls of buildings and shop windows in the town of Paphos, Cyprus; indicating that the species was possibly relatively common in this area of the eastern Mediterranean.

ECOLOGY

Life Cycle

Between 1941 and 1942, H.M. Edelsten succeeded in rearing the moth in captivity from the egg stage (Edelsten, 1944). Cockayne & Kettlewell (1940) give the life history as described by continental authors. The descriptions that follow are based on these papers supplemented by Haggett (1957).

Ovum

The eggs are generally laid in August in rows, usually under one of the lower sheaths of grasses and cereals. In nature these are said to be in two lines of twenty alongside each other (from continental authors, in Cockayne & Kettlewell, *loc. cit.*). They have also been reported to be laid on posts in fields etc. The ovum is described in Edelsten (1944).

Larva

The larva develops within the egg-shell in November and December and can be seen as a dark mass towards one side of the egg (Edelsten, 1944). They begin to hatch around April, and possibly earlier. On hatching the larva enters a grass stem near ground level, first probably eating wild grasses and later moving on to winter wheat, summer rye, oats or barley (in Cockayne & Kettlewell, *loc. cit.*). In captivity the larva has also been noted making its way down the centre of the shoot. The larva feeds internally boring into a stem, making a small round hole near the ground. When the old stem can no longer sustain the growing larva it wanders off to find a new shoot. The root-stock and lower parts of the shoot survive, but the old shoot withers and turns brown above the infected part. Only one larva occurs in each shoot, but

frequently every shoot in a plant is attacked in turn by the same larva (Cockayne & Kettlewell, *loc. cit.*). The larva has also been found in spring-sown oats and barley, though this is probably atypical and dependent on farming conditions.

When nearly full grown the larva leaves the stalk and takes up position beneath the sheathing leaf, which covers the ear of the cereal, and feeds on the unripe grains, filling the whole sheath with white frass (Cockayne & Kettlewell, *loc. cit.*). Based on field observations the whole ear and indeed several ears may be eaten. The presence of a larva may be betrayed by a small entry hole below the ear, though this can be hard to find (Edelsten, *loc. cit.*). A withered ear sheath usually indicates that the larva has left. The larva is described in Edelsten (1944) and described and illustrated in Haggett (1957). We are not aware of any recent searches for the larva.

Pupa

The full grown larva probably leaves the sheath from around the first week of June to mid June and pupates in the earth under an infected stem in a slightly earthen cocoon; when this is pulled out the pupa may be found exposed in the earth beneath. Pupation extends from June to July. The pupa is described in Edelsten (1944).

Imago

Univoltine, the adult moth is generally on the wing from late July to mid August, the peak emergence varying depending on the season.

The moth flies at dusk over cereal fields and later comes readily to light, even on cold nights. It can also be found at night, sitting on the ears of wheat and other cereals (Haggett, 1957). A standard way of finding the moth used to be by following harvesters when the moth was readily disturbed and could be netted (Bretherton, Goater & Lorimer, 1983). We are not aware of this being attempted recently. The adult has been reported to have been found by day, for example on clover heads and on a knapweed flower (in Cockayne & Kettlewell, *loc. cit.*).

Habitat requirements

The species frequents cereal fields, particularly those of wheat, barley or oats over chalk (Fig. 4). Cockayne & Kettlewell (1940) reported that the only unusual feature where the moth was found was the absence of boundary hedges, which were replaced by narrow strips of grassy ground separating one field from another. In 1939, the place where the moth was most numerous was a large field of winter wheat which abutted an enclosure of coarse grass, chiefly Cocksfoot *Dactylis glomerata* L., False Oat-grass *Arrhenatherum elatius* L. and Upright Brome *Bromopsis erecta* (Hudson), approximately 4 hectares in size and which had been allowed to go wild for some years. This enclosure provided breeding cover for game.

There appears to have been some difference in opinion as to the specific requirements of this species. Edelsten (1944) suggested that the eggs could survive being ploughed in with the stubble and those laid higher up could survive the threshing machine. This latter suggestion was supported by the observation of a threshed stack of wheat from a field that supported the Brighton Wainscot the previous year that had stood by the edge of a field of barley. All around this stack was a considerable infestation of barley, hinting that the larvae had wandered out of the straw into the growing crop. Edelsten (*loc. cit.*) also stated that there was "no trace of larvae in any of the grasses on the farm drove, and from the distribution of



Fig. 4. Typical habitat, cereal field Tilshead, June, 2001. Photo: D. G. Green, Butterfly Conservation.

the larvae in the fields it was evident that the eggs were laid on the cereal crops and not on the grasses bordering the fields, as is reported to be the habit in Russia”.

Haggett (1957) suggested that Kettlewell (1945) gave the most likely solution proposing that the main reservoir of the insect would be found outside the cultivated areas and that the larvae feed initially in grasses surrounding the fields from which the moths can invade the cereal crops and breed more successfully in them. However, Cockayne & Kettlewell (1940) suggested that the absence of bare earth for the larva to pupate in would render large areas of wild coarse grasses unsuitable. Kettlewell (*loc. cit.*) considered Edelsten’s findings to be under abnormal conditions, i.e. in 1943 Edelsten found the species during a period of unusual farming practices due to war needs and the necessity for growing the maximum amount of cereals with the normal crop rotation being abandoned, something that Edelsten himself also commented on. It is worth mentioning here that Cockayne & Kettlewell (1940) note that abroad the presence of this moth is looked upon as a sign of untidy farming and that the rotation of crops is recommended. Skinner (1984) concisely summarises the habitat of this species by noting it can be found in fields of wheat and other cereals, and surrounding grass verges.

POSSIBLE REASONS FOR DECLINE

Stubble burning: This may well have been a significant contributory factor to the decline of the species. The species was considered to be declining at Micheldever, Hampshire, because of almost universal stubble burning (Goater, 1992). Jackson (1952) also suggested the practice of burning straw and stubble in dry weather was affecting the species. Since 1993 the practice of stubble burning had ceased although

by then the moth was already very uncommon and had last been recorded from Hampshire ten years prior to this date.

Crop rotation: There is some anecdotal suggestion that crop rotation does influence the population levels of this moth, for example, the usual crop rotation in the Salisbury area was dropped during the war years and led to an abundance of this species. Cockayne & Kettlewell (1940) also suggest that crop rotation is recommended on the continent as a counter measure against the species. Any move away from cereal farming would obviously remove the habitat of this species. However, at least some farmers continue to plant cereals in the Salisbury Plain area on an annual basis.

Winter/spring cereal planting: Kettlewell (1945) notes that searches of winter sown cereal crops were unsuccessful, although Edelsten found larvae in considerable numbers in spring sown cereals. Edelsten (1944) also noted that owing to the mild winter [in 1942/1943] that the main stem of the autumn sown wheat he was using for his rearing experiments was too hard for the larvae to enter and they mostly perished. Consequently it may be that the current apparent bias, although not universal in the area, towards winter as opposed to spring planting could be having an effect upon populations. One farmer on Salisbury Plain suggested that the switch from spring planting to winter planting took place 20 to 30 years ago. Another suggested that winter planting is now the norm in the area. Ploughing takes place almost immediately after harvesting and crop harvesting is also likely to take place earlier in winter sown crops, although at least some crops on the Plain are cut after the flight period of the moth. Fox (2003) noted that the sites trapped during 2002 still had the cereal crops in place at the end of July, but in the Tilshead area these were partially cut by 12 August.

Use of combine harvesters: Jackson (1952) suggested that the increasing use of combine harvesters along with stubble burning "must re-act heavily against the insect".

Modern cereal varieties: It could be that modern cereal varieties, which tend to be shorter, may also be thicker and consequently more difficult for the young larvae to access. However, on farms that also require straw, very short varieties tend not to be used. It has been suggested that when the moth was found around Brighton in the mid nineteenth century that the wheat grew to 5 ft in height (Pratt, 1999).

Insecticides: The modern use of spraying chemicals as a means of pest control could be a major impact on this species, although insecticides are certainly not used on all farms in the Salisbury Plain area. To what extent applications and methods have changed since the 1940s needs to be researched further.

Decline in arable weeds/grasses: *Oria musculosa* is considered to be dependent for its survival upon the existence of grasses along field margins and possibly also within the cereal crop itself. The modern use of herbicides and fertilisers will have severely reduced, if not eliminated, the presence of many arable weeds from the fields. No doubt spray drift has also affected the field margins. Godfrey Smith (pers. comm.), along with his brother, who have both farmed in the Steeple Ashton area of Wiltshire for well over 40 years, suggest this may be a significant contributory factor in this species' decline. Cockayne & Kettlewell (1940) commented on the "thickness of the undergrowth of weeds" in a small area of wheat. It is of interest to note that Fox (2003) reported that at a former site, Winterslow, herbicides and fungicides had been used on the fields during the previous decade, but only once a year. This application had not prevented the growth of many of the arable weeds.

Decline in the quantity of field margins: Although the margins of the fields in the Tilshead area are still bordered by grassy boundaries, these tend only to be one or

two metres deep at most. There are a few areas neighbouring fields where there are more expansive areas of grass, but very little that approaches the 4 hectares or so noted by Cockayne & Kettlewell (1940), which they suggested was a practice frequently adopted in areas away from copses etc. at the time.

Bacterial/viral/fungal infection and parasite load: Little is known of the susceptibility of this species to infection, however Edelsten (1944) notes finding many larvae dead, presumably from bacterial disease. Edelsten (*loc.cit.*) also records that *Meloboris (Diadegma) crassicornis* (Grav.) (Ichneumonidae: Campoplegini) was bred from a parasitised larva. There is little available evidence to suggest that these are major factors.

Climate change: It may be that the climate for this moth has become unsuitable in this country. There is, however, little evidence to suggest this to be the case.

Development: The disappearance of the Brighton population in the nineteenth century has been attributed to the expansion of Brighton itself (Pratt, 1999).

Relatively few recorders visit the Salisbury Plain area on a regular basis and no static traps are operated in the area. Whilst it is possible that the species has been overlooked, there has, however, been considerable effort during the course of the survey to suggest that the few examples seen is very probably a real reflection of the current status of the species. Although it has not been possible to identify any single reason for this species' decline in central southern England with any certainty there are many potential contributory factors. The most likely factors, however, would seem to involve a combination of changes in farming practices, including stubble burning, changes in crop varieties and land management practices.

CONSERVATION MEASURES

In undertaking an assessment of the European status of this species, Parsons (2001) concluded that the UK had an international responsibility for the conservation of *O. muscolosa*. At that time a few moths were being found in the Tilshead area of Salisbury Plain and there was little reason to suggest that the status had changed much since the early 1990s. However, since 2001, no Brighton Wainscot has been seen, despite survey effort and there are now real concerns for the survival of this species in this country. It is possible that the moth still occurs at Tilshead in very low numbers and may well occur on some other part of the Plain, although continued survey effort is needed to ascertain this. Until a colony is located, no real conservation measures can be implemented.

In 2002 the Environmental Support Team of Defence Estates, under the auspices of Dominic Ash and Paul Toynton, had a trial barley field planted, with the aim of encouraging arable weeds, Brighton Wainscot and the Corn Bunting. This was planted near Tilshead and was left to grow. No further management occurred on this site until spring 2004, when half the area was ploughed with, at the time of writing, plans to resow with barley. Whether this field will prove to be suitable for Brighton Wainscot remains to be seen, although there must now be a concern that it may be too little too late.

CONCLUSIONS

The history of the Brighton Wainscot in this country is certainly an interesting one. Why the species disappeared from the Brighton area can only be speculated upon, though the expansion of Brighton does seem to be a possible explanation.

Having said that, there must have been other similar habitats in the general area at the time and bearing in mind its later abundance on Salisbury Plain and the superficial similarity of the two areas its disappearance from around Brighton does seem rather puzzling.

The moth would seem to have been resident on Salisbury Plain some considerable time before the 1930s. However, it expanded its range from Salisbury Plain from the 1930s onwards, spreading into neighbouring Hampshire and subsequently Berkshire, becoming locally common. It is clear that the moth became increasingly frequent during the war years on Salisbury Plain and for a little time after that, the most likely explanation being a change in farming practices. The moth continued to be frequent up until around the mid 1970s when it appeared to go into decline, being subsequently found in numbers only on the Salisbury Plain area. It is clear that the moth wanders, which probably accounts for some records from some counties; others, such as the Devon record, may well be the result of primary immigrants. As to the origin of the populations both in Sussex and on Salisbury Plain one can only speculate. It may be that the Brighton population was the result of a temporary colonisation from the continent, whereas that on Salisbury Plain may have been a longer-term, albeit overlooked, establishment.

There are a number of possible reasons for its current scarcity, but it is likely that a combination of changes in farming practices have had the most impact, from the practice of stubble burning, to changes in cereal varieties, increased tidiness in fields and a decline in the amount and quality of the field margins. This species does also appear to be under threat in at least some parts of Europe.

The Brighton Wainscot is certainly currently at a low ebb at its former stronghold in the Tilshead area and possibly on the verge of extinction in this country. However, as with many other insects, it is well known that species can exist at very low levels which can escape detection only to reappear when conditions become more suitable. Despite increased survey effort over recent years there are areas of the Plain that have not been searched and may well support the moth.

If you have any further information, records, particularly recent records, or observations relating to this species, MSP at Butterfly Conservation would be pleased to hear from you.

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